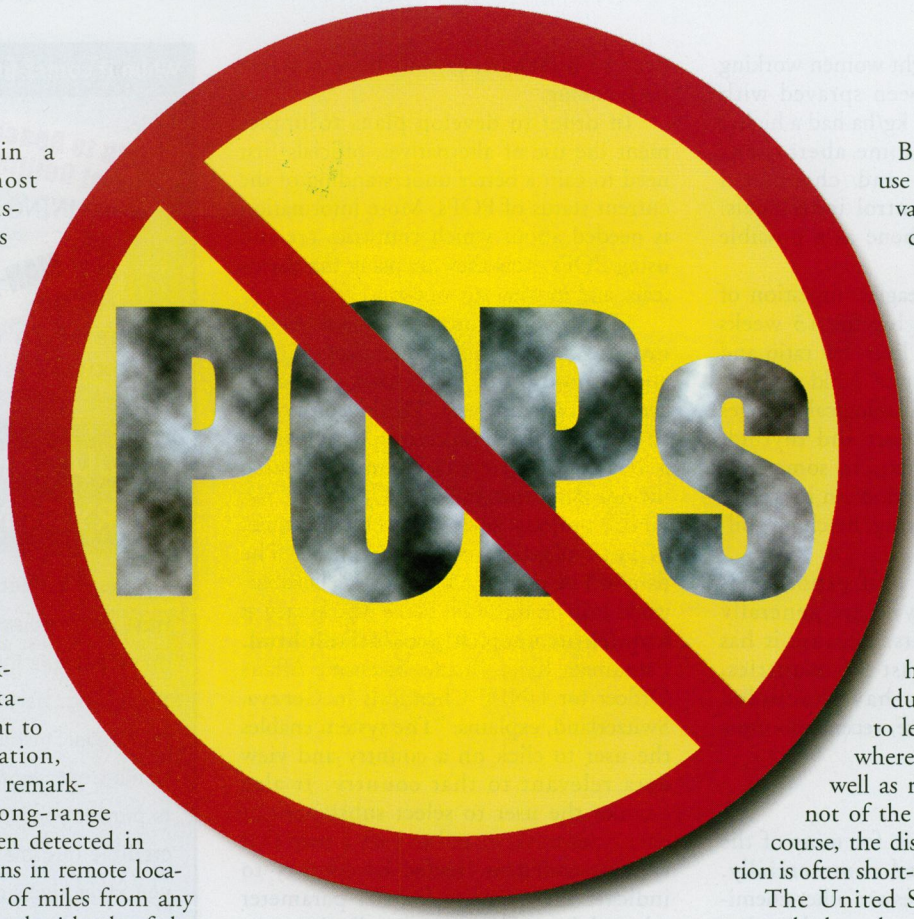

Like fugitives in a lineup, the most dangerous persistent organic pollutants (POPs)—the so-called "dirty dozen"—have been identified, and a worldwide movement is under way to limit their production and emissions. The names read like a most-wanted list of chemical criminals: DDT, toxaphene, chlordane, heptachlor, aldrin, dieldrin, endrin, mirex, polychlorinated biphenyls (PCBs), dioxins, furans, and hexachlorobenzene. Resistant to most forms of degradation, these chemicals have a remarkable propensity for long-range transport, and have been detected in fish, animals, and humans in remote locations—often thousands of miles from any known sources—such as the islands of the South Pacific and the uppermost reaches of the Arctic. Their affinity for lipids enables them to travel easily throughout the food chain and bioaccumulate in the fatty tissues of top-level predators, including humans. Even trace residues of these compounds are of growing concern to scientists, given that long-term, low-dose exposures are increasingly linked to health effects such as immunosuppression, hormone disruption, reproductive abnormalities, and cancer.

United Nations at the Helm

The march toward a global reduction of POPs is being led by the United Nations Environment Programme (UNEP), which is acting under a February 1997 mandate of its own governing council. This mandate, entitled Decision 19/13C, called for two major actions. The first was the creation of an intergovernmental negotiating committee (INC) charged with preparing a global POPs treaty, usually referred to as "the convention." The second was the convening of a separate expert group that would establish a set of scientific criteria and procedures for identifying additional POPs as candidates for future reduction efforts.

Approximately 100 nations gathered at the INC's first meeting, held in Montréal in June 1998. According to John Buccini, chair of the INC and director of the commercial chemicals evaluation branch at Environment Canada, delegates at the June meeting concerned themselves largely with organizational matters, with more substantive discussions to come in the next series of meetings. Says Buccini, "There is an expectation that there will be five meetings of the INC by the end of the year 2000. That means an INC meeting every 6–8 months. By late 2000 we expect to have concluded the text of the convention."

Although the way in which the convention will control a global reduction in POPs has yet to be determined, James Willis, director of the chemicals division at UNEP, speculates that a Conference of the Parties established by the convention is likely to act as a regulatory body. "It will possibly also be called upon by the convention to develop provisions for compliance," he says.

Current Distribution of POPs

Of the 12 chemicals currently under consideration by the INC, 9 are pesticides. One class of chemicals, the PCBs, includes industrial products used primarily as dielectric fluids in electrical transformers. The remaining two chemicals, dioxins and furans, are the unintentionally produced by-products of industrial processes. The pesticides and the PCBs were widely produced after World War II, with peak production and environmental releases occurring during the 1960s and 1970s.

Because production and use data fluctuate and often vary according to source, it can be difficult to determine exactly which countries are producing, using, or exporting commercially produced POPs from among the group of 12. Says Willis, "Production of certain of the POPs appears to have shifted from [Organization for Economic Co-operation and Development] countries, for which we had reasonably good production and trade figures, to lesser developed countries, where production facilities, as well as record keeping, are often not of the same standard. And, of course, the discontinuation of production is often short-term."

The United States and Canada, for example, have banned or restricted the use of all of the intentionally produced chemicals within their domestic borders. The last of the POP pesticides to be produced in the United States was chlordane, which was manufactured for export by Velsicol Chemical Corporation until May 1997. However, a UNEP report entitled *UNEP Survey on Sources of POPs*, presented at the Intergovernmental Forum on Chemical Safety's Expert Meeting on Persistent Organic Pollutants, held in Manila in June 1996, found that many of the 60 countries surveyed were still trading in the nine POPs pesticides. Asian and South American countries, for example, reported import of most of the nine POPs pesticides, while countries in Europe reported export of most of them. Only two countries in Africa had ceased trade of chlordane, dieldrin, or heptachlor.

According to Buccini, even countries that have banned production of the commercially produced POPs are still grappling with problems of management and continuing use. As an example, he points out that the vast majority of developed countries, including the United States, have active PCB-containing transformers. He adds that existing stockpiles of POPs are also an issue in these countries, as they are worldwide. Stockpiles are a particularly tenacious problem in countries that lack appropriate disposal facilities. Destroying these stockpiles

safely, which is the ultimate goal of the UNEP mandate, will likely require shipping them to industrialized nations. As for dioxins and furans, advances in pollution control have sharply reduced emissions of these by-products from some sources in many developed countries. However, in most parts of the world, including even those countries where such controls are available, emissions are a continuing problem.

POPs Elimination or Risk Management?

Although the specific goals of the convention are still being developed, a sticking point is already beginning to emerge over the extent to which the INC will seek to eradicate production of POPs altogether. A number of environmental nongovernmental organizations, composed mostly of international environmental organizations, have formed a group known as the International POPs Elimination Network, which is calling for a complete cessation of production of POPs worldwide. "These are the worst chemicals out there, and we have to eliminate production and destroy stockpiles," says Sharon Newsome, director of environment programs with the Washington, DC-based environmental group Physicians for Social Responsibility, a member of the network. "Many of these chemicals are being used in an indiscriminate way," she says. "We have to help countries move away from that, and the goal has to be elimination."

Michael Walls, senior legal counsel with the Chemical Manufacturers Association, disagrees. He offers that risk management strategies may be preferable to outright elimination. Says Walls, "We're looking for a risk and exposure evaluation for each of the chemicals. Once you have a risk and exposure evaluation, you can weigh the benefits of giving up a particular chemical. If the risks are unmanageable, then elimination is appropriate."

Buccini acknowledges that resolving the issue of elimination versus risk management is important, and says that the issue will be a primary agenda item for the INC in its next series of meetings. "Hopefully, [the debate] will be marked by a creative tension," says Buccini. "But we have to remember it's up to the governments to find a compromise. Having said that, we come back to the original language of the mandate, which calls for reduction with an eye towards elimination."

Buccini adds that the process is aided by the fact that there is diminishing demand for 6 of the 10 commercially produced POPs: aldrin, dieldrin, endrin, hexachlorobenzene, heptachlor, and chlordane. As alternatives have been developed, uses for these pesticides have dropped off in many countries. "I don't believe there are any defenders of . . . these compounds," he says.

The DDT Debacle

DDT remains an exception, however. According to a 1998 report by the World Wildlife Fund entitled *Resolving the DDT Dilemma: Protecting Human Health and Biodiversity*, approximately 30,000 metric tons of DDT were produced by six countries in 1995 for use against the malaria-transmitting *Anopheles* mosquito. Between 300 and 500 million people a year are stricken with malaria and up to 3 million of them die from it, making it one of the biggest public health menaces in the developing world. It is therefore critical that DDT reduction is conducted in a way that carefully balances the public health benefits of the pesticide against its toxicological effects in nontarget organisms.

Buccini says that tackling the issue of continued DDT use is the most pressing issue on the INC's agenda. But fortunately, says Karen Perry, associate director of the environment and health program for Physicians for Social Responsibility, alternatives to DDT are available, and some of them have a demonstrated record of success. Says Perry, "Biological controls are effective. So are bed-netting programs; the *Anopheles* tends to bite at night." But she adds that the cost of replacing DDT with nonpesticide alternatives can be substantial, and that no one assumes that DDT elimination will happen quickly.

Other POPs Initiatives

The INC is directed by UNEP to carefully consider regional attempts to reduce production and use of POPs as it develops its own global agenda. The North American Regional Action Plans for DDT and chlordane, which are being developed by the Montréal-based Commission for Environmental Cooperation, an intergovernmental organization that was formed to administer the environmental provisions of the North American Free Trade Agreement, provide an example. The action plans are designed to eliminate use of DDT and chlordane in Mexico by the year 2007. Officials in the United States, Canada, and Mexico are currently exploring alternatives to these chemicals that include improved sanitation, increased disease surveillance, and integrated pest management schemes based on biological controls and nonpersistent pyrethroid chemicals.

Another major international POPs reduction effort being closely monitored by the INC is being waged by the United Nations Economic Commission for Europe. This regional organization signed an agreement on 24 June 1998 in Århus, Denmark, aimed at eliminating "discharges, emissions, and losses" (accidental environmental releases) of POPs among its 51 member countries, including the Unites States. The agreement is focused on 16 chemicals, including hexachlorocyclohexane, hexabromobiphenyl, chlordecone, and polycyclic aromatic hydrocarbons, in addition to the 12 being considered by the INC.

According to Buccini, issues surrounding technical assistance and technology transfer, as well as the financial aspects of a global POPs convention, will be addressed at the next meeting of the INC to be held 25–29 January 1999 in Nairobi, Kenya. "Technical and financial assistance is extremely important to developing countries," says Perry. "We need to help them find alternatives. They need good monitoring data describing uses, body burdens, fate and transport, and environmental levels. They need a baseline of information on what they're doing with POPs so they can continue to get away from [using] them." Perry adds that, although it is too early to predict the final shape of the convention, it is likely that there will be a greatly increased emphasis on information exchange on POPs production and use within member countries.

However, the convention is faced with a number of considerable hurdles. "One of the key issues in implementing the convention is financing," says Buccini. "We need to get to a meaningful point in the negotiations where we agree on the goals for each POP. Technical assistance, cooperation, and financial issues are always difficult to address without a clear agreement on the bulk of control measures. When we clarify these, we can determine appropriate implementation measures."

The widely varying socioeconomic conditions of the countries participating in the convention will certainly be a pivotal issue when financial support is discussed. The UNEP governing council says that the convention should address the "special needs of developing countries and countries with economies in transition." Such countries often lack the financial resources to implement alternatives to the often cheap and easy-to-produce or -import POPs. Furthermore, industrial pollution control technologies that limit dioxin and furan emissions can be expensive, and require a skilled workforce to operate and monitor.

In the long run, says Buccini, challenging, but practical, implementable, and ultimately affordable measures are the goal of the convention.

Charles W. Schmidt